

PA Milk Marketing Board
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What About Robotic Milking?

Who knew? People were talking about robots that milk cows before the 1970s. Most of us might assume that early development took place in the United States, but, surprisingly, that is not the case.

According to [RoboticsBiz \(2020\)](#), the first patent for an automated milking system was issued in East Germany in 1971. Trials using various types of technology to locate the teats—ultrasonic sensors, closed circuit TVs, and lasers to name a few—were conducted in both Germany and The Netherlands between that time and the mid-1980s. It took until 1985 before the first milking cup was attached to a teat using a robotic arm and the following year the Japanese began to develop their own milking robot.

I feel compelled to interject here, “What were those poor cows thinking?”

According to Michigan State University, robotic milking technology was not introduced into the US until 2000. Proponents state that it provides more flexibility for farmers and allows cows to be milked on their “own time.”

The procedure works something like this. Each cow wears an electronic collar that allows the robot to identify her and track her health, diet, and milk production. Cows that are not ready to milk are turned back out to pasture; those ready to milk have their teats cleaned by the robot that then uses a laser to attach milking cups to the udder. At this time, they also receive any nutritional supplement they need based on their milk production.

Robots are also capable of analyzing milk as it is being collected to determine various measures of quality. Following the collection of milk, the procedure is very similar to non-robotic milking in that the milk is directed into a bulk tank for storage and cooling.

Dairy-Cattle.Extension.org reported in 2019 that there are about 35,000 milking robots in use around the world. Each unit costs anywhere from \$150,000 to \$200,000. Considering that historical data show they are less profitable to use than conventional milking systems, I am surprised there are that many.

Reported benefits for those that can afford the system include savings of up to 29 percent on labor costs. In addition, farmers in Minnesota and Wisconsin stated that the time saved by not having to hand-milk cows allowed them to conduct important activities such as improving herd health, records analysis (which often gets delayed), and better planning for forage harvest. These same farmers also shared their concerns about the possibility of access to immigrant farm laborers, which have been reported to make up over 50 percent of all farm workers (Adcock, 2015).

In a study conducted by the University of Minnesota during the period 2011 through 2015, herds milked using robotic systems had higher milk production and gross margin, but costs were higher, which reduced profitability.

Further reading convinced me that it would be difficult for farmers in the commonwealth to adopt robotic milking systems. Researchers from Minnesota developed a web-based simulation system to predict economic and other results using the systems with 120-, 240, and 1500-cow herds and various inputs such as type and amount of feed. Results of running the simulations many times showed that the larger the herd, the more efficient and profitable the operation.

Since we know that about 85 percent of our PA dairy farms have 100 or fewer cows, and 95 percent have 200 or fewer cows, I believe we can all see there might be issues, particularly with costs, trying to use robotic systems in our state. However, there is some light at the end of this tunnel!

Penn State Extension has been working with a number of farms across the state to implement robotic milking systems. Estimates are that there are roughly 35 to 40 farms using the systems and experts believe they will become more popular over time. Funding the operations could be a challenge, but farmers working with Penn State have been able to use conventional farm credit sources to do so and several of the farms have only one robot.

The Board and staff appreciate any technology and innovation that makes the hard job of dairy farming a little easier, while also recognizing that unique conditions in our state don't always make adoption of those innovations practical. We also look forward to more studies to show the impact of robotic milking where it is employed in the commonwealth.

PMMB is always available to respond to questions and concerns. I can be reached at 717-210-8244 or by email at chardbarge@pa.gov.